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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference MPH-106107-0	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US99/07918	International filing date *(day/month/year)* 09 APRIL 1999	Priority date *(day/month/year)* 09 APRIL 1998
International Patent Classification (IPC) or national classification and IPC IPC(7):G01N 31/16; G05D 21/02; C23F 1/08 and US Cl.:422/75, 62, 63, 55; 436/163		
Applicant DJ PARKER COMPANY, INC.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of report with regard to novelty, inventive step or industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand 09 NOVEMBER 1999	Date of completion of this report 24 AUGUST 2000
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer JILL WARDEN DEBORAH THOMAS PARALEGAL SPECIALIST Telephone No. (703) 308-0661

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US99/07918

I. Basis of the report

1. With regard to the elements of the international application:*

[X] the international application as originally filed

[X] the description:
pages 1-26 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

[X] the claims:
pages 27-37 , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

[X] the drawings:
pages 1-7 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

[X] the sequence listing part of the description:
pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

[ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

[ ] the language of publication of the international application (under Rule 48.3(b)).

[ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

[ ] contained in the international application in printed form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readable form.

[ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] The statement that the information recorded in computer readable form is identical to the writen sequence listing has been furnished.

4. [X] The amendments have resulted in the cancellation of:

[X] the description, pages NONE
[X] the claims, Nos. NONE
[X] the drawings, sheets/~~fig~~ NONE

5. [X] This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US99/07918

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims	(Please See supplemental sheet)	YES
	Claims	(Please See supplemental sheet)	NO
Inventive Step (IS)	Claims	(Please See supplemental sheet)	YES
	Claims	(Please See supplemental sheet)	NO
Industrial Applicability (IA)	Claims	(Please See supplemental sheet)	YES
	Claims	(Please See supplemental sheet)	NO

2. citations and explanations (Rule 70.7)

Claims 1-6, 9-18, 23-52, 55-59, and 62-63 lack novelty under PCT Article 33(2) as being anticipated by Sakisako et al (US 4,749,552).

Sakisako et al (US 4,749,552) disclose an automatic titration analysis apparatus comprising:
an analyzer (S of figure 1) for determining the proportion of on of the predetermined chemical constituents in the chemical solution to be delivered;
a precision analyzer sample delivery arrangement(S)for delivering to said analyzer a sample of the chemical solution;
a controller (C and 15 of figure 1) for receiving information relative to the determination by said analyzer of the proportion of one of the predetermined chemical constituents in the chemical solution to be delivered; and
a replenisher responsive to said controller for dispensing a controlled quantity of the predetermined chemical constituent.

Sakisako et al also teach that the analyzer is a titrator system (T of figure 1) which comprising
a reaction cell (9 of figure 1) for receiving a sample of the chemical solution from said precision analyzer sample delivery arrangement; and
a sensor (12 or 13 of figure 1) for measuring selectably a predetermined characteristic of the chemical solution and th progress of a reaction.

With respect to claims 4-6, Sakisako et al have disclosed that the reaction cell comprises a glass beaker (ref 9 of fig 1). Sakisako et al have also taught that the sensor comprises a pH electrode (11 of fig 3) and a ORP electrode (12 of figure 3).

Regarding to claim 9, Sakisako et al disclose all the limitation of this claim (see col 6, lines 1-4).

As with claims 10-15, Sakisako et al have taught that the (Continued on Supplemental Sheet.)

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

I. BASIS OF REPORT:

5. (Some) amendments are considered to go beyond the disclosure as filed:
NONE

V. 1. REASONED STATEMENTS:
The report as to Novelty was positive (YES) with respect to claims 7, 8, 19-22, 53, 54, 60, 61, 64-67, 70-72.
The report as to Novelty was negative (NO) with respect to claims 1-6, 9-18, 23-52, 55-59, 62, 63, 68, 69, 73-77.
The report as to Inventive Step was positive (YES) with respect to claims NONE.
The report as to Inventive Step was negative (NO) with respect to claims 1-77.
The report as to Industrial Applicability was positive (YES) with respect to claims 1-77.
The report as to Industrial Applicability was negative (NO) with respect to claims NONE.

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):
automatic titration apparatus further comprises a global loop for distributing the chemical solution (see S of fig 1). For claims 11-15, Sakisako et al do disclose all the limitations of these instant claims (see ref 56 of figure 3 and 15 of figure 1).

With regard to claims 16-18, Sakisako et al disclose the titration apparatus having a chemical sensor (ref 11, 12 of figure 3) and said display (56) displaying information responsive to the calibration of the chemical sensor. Furthermore, Sakisako et al teach that the titration apparatus is comprising a chemical tank (9 of figure 1), said display (56) displays information responsive to the amount of the chemical solution in the chemical tank, and a liquid level monitoring arrangement (10 of figure 1) coupled between chemical tank and the controller.

With respect to claims 23-24, Sakisako et al have disclosed the purge system (13 of figure 1) which comprises a gas purge valve (SV3) for controlling pressurized purge gas.

Regarding to claims 25-26, Sakisako et al have disclosed all the limitation of the instant claims (see col 5, line 5-35).

With regard to claims 27-29, Sakisako et al disclose an automatic titration analysis apparatus comprising:
a precision analyzer sample delivery arrangement (S and 3 of figure 1);
a reaction cell (9) for receiving the precise sample of the chemical solution;
a precision analyzer reagent delivery arrangement (T);
a sensor for measuring a characteristic of the chemical solution (11,12 of fig 1);
a controller for receiving information relative to the characteristic of chemical solution measured by the sensor (C of fig 1);
a replenisher (1) responsive to the controller for receiving a controlled quantity of the predetermined chemical constituent. The apparatus is comprising a second sensor (10 of figure 1) for detecting availability of the chemical solution.

With respect to claims 30-32, Sakisako et al (US 4,749,552) have taught all the limitations of these claims (see reference 3 of figure 1 and 41 of figure 3).

As with claims 33-35, Sakisako et al (US 4,749,552) have also disclosed the automatic titration apparatus comprising a replenisher (1) is arranged to deliver the controlled quantity of predetermined chemical constituent to a storage tank (4) of the chemical solution. The apparatus of Sakisako is further providing a cleanup arrangement for clearing the reaction cell (SV2, 14 of figure 1) and the cleanup arrangement comprising a purge gas (pump 13 of figure 1).

Regarding to claims 36-37, Sakisako et al have also disclosed all the limitations of these instant claims (see col 5, lines 18-22, ref 14, SV2, SV4, and SV5 of figure 1).

With respect to claim 38, Sakisako et al also teach a method of analysis of a chemical solution in a tank comprising the steps of:
delivering a sample of the chemical solution having the first chemical composition to an analysis cell;(col 3, 1st para, col 5, 1st and 2nd paragraph);
performing a titration analysis on the chemical solution having the first chemical composition that has been delivered to the analysis cell, including the further steps of:

controlling a syringe to deliver a titrant to the chemical solution; and

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

monitoring a predetermined chemical characteristic of the chemical solution during performance of said titration analysis;
determining an end point of the titration analysis; and
conducting a cleanup procedure (see col 5, 1st and 2nd paragraphs and lines 5-57).
With regard to claims 39-40, Sakisako et al have disclosed all the limitations of these claims (col 5, lines 50-57).

Regarding to claims 41-42, Sakisako et al have taught all the limitations of these instant claims (see col 6, 1st paragraph).

As with claims 43-44,Sakisako et al disclose a step of purging from a sample loop all liquid associated with prior sample and using level sensor (10 of figure 1) for detecting and confirming the delivery of all reagents (col 3, lines 29-32).

With respect to claims 45-46, Sakisako et al teach the step of timing the delivery of each chemical solution and performing a titration analysis comprises the further step of delivering a condition reagent (col 7, lines 17-19 and col 5, lines 36-47).

As with claim 47, Sakisako et al teach the step of delivering a condition reagent comprises the further step of controlling gravity feed arrangement (see 16 and SV1 of figure 1).

With regard to claims 48-52, Sakisako et al have disclosed a method comprising the step of controlling a pump and controlling a syringe to convey a titrant, controlling a stepper drive motor coupled to the syringe, analyzing predetermined chemical characteristic by taking analog readings of chemical characteristic, and determining an end point of each titration analysis (see col 4, lines 41-47 and col 6, 1st paragraph).

As with claims 55-59, Sakisako et al have taught a method of propelling a rinse water by purge gas, stirring a titration vessel cuasing foaming to optimize tiration and stirring and cycling a sample syringe until it is cleaned (col 3, lines 42-45, col 5, lines 18-27, lines 36-57, lines 5-17).

Regarding to claims 62-63, Sakisako et al have disclosed a method comprising the step of performing differential titration analysis and determining the sensitivity of the ORP electrode (col 6, 1st paragraph, lines 65-67).

Claims 68-69 and 73-75 lack novelty under PCT Article 33(2) as being anticipated by Entwistle (US 4,668,346).

Entwistle (US 4,668,346) has taught a method for ion concentration analysis using an ion-selective electrode comprising the steps of:

delivering a sample of the chemical solution having the first chemical composition to a cell;
performing an ion selective analysis including the further steps of:
delivering a plurality of predetermined amounts of standard solution having a known concentration of analyte; and
measuring an electrode potential value of an ion selective electrode
determining a quantity of an analyte in the chemical solution including the further step of extrapolating a plurality of the measured electrode potential values back to a predetermined point of analyte concentration (col 1, lines 15-39).
delivering a plurality of predetermined amounts of standard solution comprising delivery of between 2 an d6 predetermined amount of standard solution (col 1, lines 66-68).

Entwistle (US 4,668,346) has also taught the step of reducing the rate at which said step of delivering a plurality of predetermined amounts of a standard solution is performed and extrapolating a plurality of the measured electrode potential values back to point of zero analyte concentration and delivering the plurality of predetermined amounts of the standard solution having the concentration of analyte in the standard solution is high relative to the concentration of the analyte in the chemical soltution that has been delivered to analysis cell,whereby dilution of the chemical solution having the first chemical composition is reduced (see step b, h, and i of col 1).

Claims 76-77 lack novelty under PCT Article 33(2) as being anticipated by Riley (GB 2059531).

Riley (GB 2059531) has disclosed a pipe joints fitting comprising:
a flared tube end (16 of figure 1) having an annular surface;
a compression washer (22) for interfacing axially with said flared end; and

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

a compression fitting (14 adn 18) having a threaded portion for urging said flared tube end into axial compression against said compression washer.

Claim 7 lacks an inventive step under PCT Article 33(3) as being obvious over Sakisako et al (US 4,749,552) in view of Entwistle (US 4,668,346).

Sakisako et al (US 4,749,552) fail to teach the use of ion selective electrode. Entwistle (US 4,668,346) discloses the use of ion selective electrode (see the abstract). Therefore, it would have been obvious to one having ordinary skill in the art to modify the automatic titration apparatus disclosed by Sakisako et al with the suggestions of Entwistle to provide an automatic titration apparatus with capability to determine ion concentration analysis.

Claims 19-22 lack an inventive step under PCT Article 33(3) as being obvious over Sakisako et al (US 4,749,552). Sakisako et al have disclosed the automatic titration apparatus with a transducer (col 3, lines 42-45). However, Sakisako et al fail to teach the use of the transducer for monitoring pressure in the apparatus. It would have been obvious to one having ordinary skill in the art at the time of invention was made to recognize that the transducer taught by Sakisako et al can be used to monitor the pressure in the system and provide accurate pressure readings.

Claims 53-54 lack an inventive step under PCT Article 33(3) as being obvious over Sakisako et al (US 4,749,552). Sakisako et al fail to disclose the step of determining an end point of each titration are repeated between 2 and 9 times. However, it would have been obvious to a skilled person in the laboratory to repeat the end point titration to get reproducible results. It would have also been obvious to a routineer to force gas purge backward through a filter through which was flowed the chemical solution having the first chemical composition that has been delivered to the cell to effectively clean the system from chemical solution.

Claims 60-61 lack an inventive step under PCT Article 33(3) as being obvious over Sakisako et al (US 4,749,552). Sakisako et al do not specifically teach the step of calibrating a pH electrode. However, it would have been obvious to a skilled technician in the laboratory to calibrate pH electrode prior to the experimentation as a common practice in the laboratory.

Claims 8 and 64-67 lack an inventive step under PCT Article 33(3) as being obvious over Sakisako et al (US 4,749,552) in view of Janzen (US 4,095,272).

Sakisako et al (US 4,749,552) fail to provide a method having the step of determining a turbid end point of the titration analysis and titrating a solution of unknown cyanide concentration employs a silver ion. Sakisako et al (US 4,749,552) have also failed to disclose the use of turbidity sensor. However, Janzen (US 4,095,272) has taught a method of automatic turbidimetric titration using turbidity sensor to determine the turbid end point of the titration (see col 2, lines 6-14 see figures 1-3). Janzen (4,095,272) teach the use of tubidity sensor for the automatic turbidimetric titration apparatus (26 of figure 3). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to modify the automatic titration apparatus disclosed by Sakisako et al with the teachings of Janzen to provide an apparatus and a method that can be used for titration of ionic surfactants.

Claims 70-72 lack an inventive step under PCT Article 33(3) as being obvious over Entwistle (US 4,668,346).

Entwistle (US 4,668,346) fails to teach the electrode potential differences between 3 mV and 40 mV. However, it would have been obvious to one having ordinary skill in the art should be able to determine the range of potential differences by experimenttation to provide an accurate calibration for the electrode.

Claims 1-77 meet the criteria set out in PCT Article 33(4), because they are directed to a chemical control system for automatic titration analysis.

---------- NEW CITATIONS ----------
NONE

PATENT COOPERATION TREATY

PCT

09/647871

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
MPH-106107-0		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 99/ 07918	09/04/1999	09/04/1998
Applicant		
DJ PARKER COMPANY, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 5

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/07918

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C23F1/08 G01N31/16 G05D21/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 C23F G01N G05D C23C C25D G03D C23G F16L G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 055 751 A (BUSSMANN ET AL.) 25 October 1977 (1977-10-25)	1,3-5, 10-15, 17,18, 23,27, 33,34
A	abstract column 3, line 12 - column 4, line 41 column 5, line 26 - column 7, line 4 column 7, line 26 - column 11, line 53; figures 1-6	25,26,36

X	US 5 484 626 A (STORJOHANN ET AL.) 16 January 1996 (1996-01-16) column 2, line 27-50 column 4, line 22 - column 6, line 45 column 8, line 1-36; figure 1	1-5, 10-12,27

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 August 1999	10/08/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Beitner, M

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 749 552 A (SAKISAKO ET AL.) 7 June 1988 (1988-06-07)	1-6, 9-13,16, 23,27, 30-34, 36-43, 46,48-51
A	abstract column 2, line 42 - column 3, line 45 column 4, line 25 - column 6, line 50 column 6, line 65 - column 7, line 16; figures 1-3	25,26, 44,56,59

X	EP 0 517 339 A (APPLIKON DEPENDABLE INSTRUMENTS B.V.) 9 December 1992 (1992-12-09)	68-75
A	abstract page 2, line 1 - page 4, line 30 page 4, line 53 - page 5, line 41 page 10, line 1-48; figures 1,3-5	1,2,7, 62,63

A	US 4 668 346 A (ENTWISTLE) 26 May 1987 (1987-05-26) abstract column 1, line 6 - column 3, line 4 column 4, line 24 - column 6, line 40 column 7, line 18 - column 8, line 19; figures 1,2	68,69, 74,75

A	US 3 717 435 A (S. ERTL ET AL.) 20 February 1973 (1973-02-20) column 2, line 70 - column 3, line 31 column 3, line 54 - column 4, line 59; figures 1-3	1-7,22, 38-42,50

A	DE 35 05 342 A (WTW WISSENSCHAFTLICH-TECHNISCHE WERKSTÄTTEN) 21 August 1986 (1986-08-21) abstract page 3, line 1 - page 4, line 1 page 5, line 19 - page 7, line 29; figures 1-3	60,61

A	US 4 095 272 A (JANZEN) 13 June 1978 (1978-06-13) column 1, line 3 - column 2, line 14; figures 1-3	1-3,8, 38,64-67

A	US 5 568 882 A (TAKACS) 29 October 1996 (1996-10-29) abstract column 3, line 30-55 column 4, line 29 - column 5, line 31; figure 1	18-21

	-/--	

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 623 554 A (KASCHAK ET AL.) 18 November 1986 (1986-11-18) abstract column 1, line 33-61 column 3, line 9-55 column 4, line 36 - column 5, line 54 column 6, line 46 - column 7, line 34; figures 1,2A-C	1,50-53
X	GB 2 059 531 A (S. W. HART & CO. PTY. LTD.) 23 April 1981 (1981-04-23) abstract; figure 1	76,77
X	FR 2 241 712 A (DUNKEL ET AL.) 21 March 1975 (1975-03-21) page 2, line 24 - page 3, line 2; figure 2	76,77
A	US 5 503 438 A (SWAUGER) 2 April 1996 (1996-04-02) abstract; figures 1-4	76,77
A	US 5 364 134 A (ANDERSON) 15 November 1994 (1994-11-15) column 3, line 10-35; figures 5,6	76,77

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/07918

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		AT 348065 B	25-01-1979
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		DE 69302315 T	10-10-1996
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US 4623554 A	18-11-1986	CA 1223157 A	23-06-1987
		DE 3685241 A	17-06-1992
		EP 0194530 A	17-09-1986
		JP 1591512 C	30-11-1990
		JP 2015634 B	12-04-1990
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GB 2059531 A	23-04-1981	NONE	
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		DE 2430701 A	23-01-1975
US 5503438 A	02-04-1996	AU 4912596 A	27-08-1996
		EP 0824645 A	25-02-1998
		WO 9624795 A	15-08-1996
US 5364134 A	15-11-1994	US 5364135 A	15-11-1994

PCT

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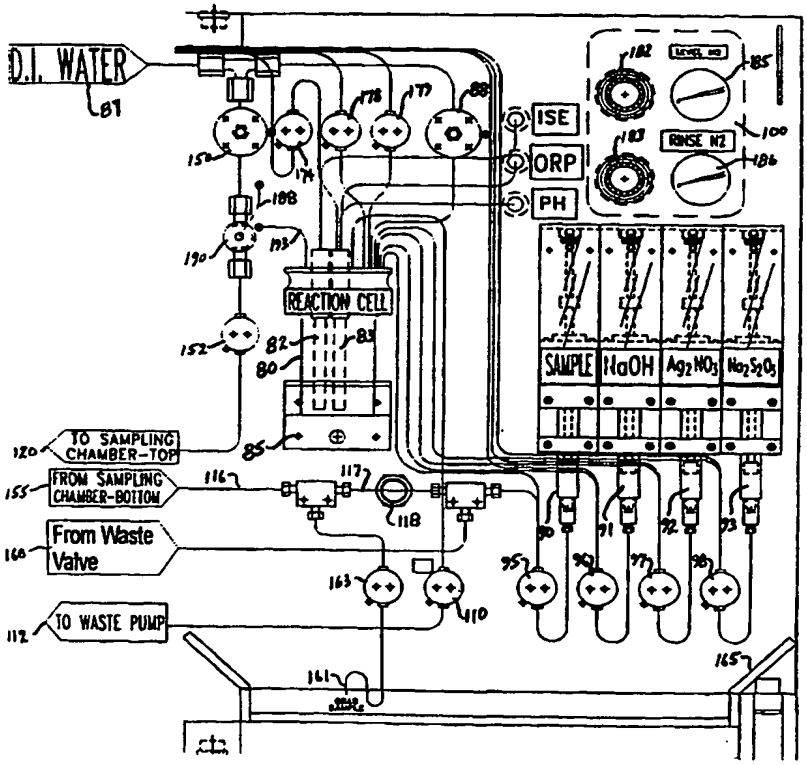
(54) Title: AUTOMATED CHEMICAL PROCESS CONTROL SYSTEM

(57) Abstract

A chemical delivery system for a liquid chemical having predetermined chemical constituents employs an analyser for determining the proportion of one of the predetermined chemical constituents in the liquid chemical to be delivered. Precise quanta of samples of the liquid chemical are delivered to the analyzer by a precision analyzer sample delivery arrangement in the form of an automated sample syringe. Information relative to the determination by the analyzer of the proportion of at least one of the predetermined chemical constituents in the liquid chemical to be delivered is stored in a controller, which may be implemented in a microcomputer. The controller then controls a replenisher that issues a precisely controlled quantity of the predetermined chemical constituent to the source of the liquid chemical. Analyses are repeated and subjected to checks on values and trends to ensure the result is accurate, reasonable, and repeatable. During titration analysis, multiple phases of operation are implemented to control the titration particularly near the end point to ensure accuracy. After each analysis, a cleanup procedure is implemented using a purge gas, such as air, and a rinse solvent, which forcibly clears out the prior sample. The sample syringe is repeatedly cycled until it too clears out the prior sample.



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